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Applying the Approximating Clamp during Breast Microsurgery: Is Upside Down the Right Way Up?

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Over recent decades, the pioneering developments in the field of reconstructive microsurgery have included perforator flaps, supermicrosurgery, and vascularized composite allograft transplantation.^{1,2} Despite significant improvements in microscopes, surgical instruments, and the overall success rates of free tissue transfer, the technical steps that consistently lead to successful microvascular anastomosis have remained largely unchanged since the original work by Acland and Bunke over 50 years ago.^{3,4}

The selection and correct application of microsurgical clamps is rarely taught, but contributes to the solid fundamentals residents require when looking to achieve predictable results in microsurgery. The use of two single microvascular clamps, using the posterior wall first (“one-way-up”) technique, confers a number of advantages, especially in digital replantation, where space to allow turning of a double approximating clamp is limited.^{4,5} However, this technique is less forgiving and technically more challenging for inexperienced microsurgeons to utilize successfully. Many residents gain much of their early microsurgical experience in elective breast surgery, where anastomoses are most commonly performed end-to-end on to the internal mammary vessels. In this setting, a double approximating clamp, consisting of two parallel, atraumatic microvascular clamps on a sliding bar, can hold vessel ends together without tension. This creates a stable base upon which the anastomosis can be performed using either the 180-degree suture placement technique (our preferred technique) or the one-way-up technique.

The senior author of this article (D.A.M.) has used the double approximating clamp for over 1000 microvascular anastomoses, with a corresponding flap survival rate approaching 99%, finding it particularly useful when training junior microsurgeons. A simple modification of the standard application of the approximating clamp,

placing it upside down, overcomes the primary disadvantage of this technique (see Video [online], which demonstrates an end-to-end arterial anastomosis between the deep inferior epigastric vessels and the internal mammary vessels, showing issues associated with the standard application of a double approximating clamp. The video also highlights a useful modification, placing the double approximating clamp upside down, therefore creating more space for the passage of the microsurgical instruments, removing the physical obstruction caused by the clamp itself, and permitting a more straight forward microsurgical anastomosis). If the approximating clamp is applied in its standard intended orientation, with the jaws of the clamps facing away from the operating microsurgeon, the inferior handle of the clamp sits flat on the base of the wound whilst the superior handle of the clamp sits at an angle, giving the clamp projection from the base of the wound. This causes a physical obstruction, catching microsurgical instruments and sutures. In contrast, placing the double approximating clamp upside down with the clamps facing away from the operating microsurgeon, the flat inferior handle now faces upward, whereas the angled superior handle faces downward out of the way. Once flipped over to suture the back wall, the superior handle is now out of the path of the microsurgical instruments. This simple modification greatly assists the inexperienced microsurgeon to perform a successful anastomosis. It is possible to apply the clamp from the side of the assistant, with the jaws facing the operating microsurgeon; however, this is often clumsy and time-consuming.

In summary, we advocate the use of the double approximating microvascular clamp, particularly for residents learning breast microsurgery, but would suggest that applying it upside down is probably the right way up!

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DISCLOSURE

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